Net-Centric Implementation Framework

Part 1: Overview

Part 2: ASD(NII) Checklist Guidance

Part 3: Migration Guidance

Part 4: Node Guidance

Part 5: Developer Guidance

Part 6: Acquisition Guidance

V 1.3

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Net-Centric Enterprise Solutions for Interoperability (NESI) is a collaborative activity of the USN PEO for C4I and Space, the USAF Electronic Systems Center, and the Defense Information Systems Agency.

Table of Contents

1 NESI Implementation

NESI Part 6: Acquisition Guidance is the final of six parts of the NESI implementation document set. Part 6 is intended for program managers and DoD contractors. It outlines the acquisition process and system/product requirements appropriate to achieving NESI compliance. It relates the steps of the System Acquisition Framework,[1] from concept refinement to post-contract award, to NESI tenets and principles. This section is currently under revision; an updated Part 6 will be included in the next version of the document set.

Section 1 of Part 6 contains NESI background information. For more introductory information, see the first part of this document set, *NESI Part 1: Overview*.

1.1 References

(a) DoD Directive 5000.1, *The Defense Acquisition System*, 24 November 2003.

(b) DoD Instruction 5000.2, *Operation of the Defense Acquisition System*, 12 May 2003.

(c) DoD Directive 8100.1, *Global Information Grid (GIG) Overarching Policy*, 21 November 2003.

(d) DoD Directive 4630.5, *Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)*, 05 May 2004.

(e) DoD Instruction 4630.8, *Procedures for Interoperability and Supportability of Information Technology (IT) and National Security Systems (NSS)*, 30 June 2004.

(f) DoD Directive 5101.7, *DoD Executive Agent for Information Technology Standards*, 21 May 2004.

(g) *DoD Global Information Grid (GIG) Architecture, Version 2.0*, August 2003.

(h) *DoD Architecture Framework (DoDAF), Version 1.0*, 9 February 2004.

(i) *DoD Net-Centric Data Strategy*, DoD Chief Information Officer, 9 May 2003.

(j) CJCSI 3170.01E, *Joint Capabilities Integration and Development System*, 11 May 2005.

(k) CJCSM 3170.01B, *Operation of the Joint Capabilities Integration and Development System*, 11 May 2005.

(l) CJCSI 6212.01D, *Interoperability and Supportability of Information Technology and National Security Systems*, 8 March 2006.

(m) *Net-Centric Operations and Warfare Reference Model (NCOW RM) V1.0*, September 2003.

(n) *Net-Centric Checklist, V2.1.3*, Office of the Assistant Secretary of Defense for Networks and Information Integration/Department of Defense Chief Information Officer, 12 May 2004.

(o) *A Modular Open Systems Approach (MOSA) to Acquisition, Version 2.0*, September 2004.

(p) DoD IT Standards Registry (DISR), http://disronline.disa.mil.

[1] Reference (b)

(q) *Net-Centric Attributes List*, Office of the Assistant Secretary of Defense for Networks and Information Integration/Department of Defense Chief Information Officer, June 2004.

(r) *Global Information Grid (GIG) Key Interface Profiles (KIPs) Framework (DRAFT)*, Version 0.95, 7 October 2005.

1.2 Overview

Net-Centric Enterprise Solutions for Interoperability (NESI) provides, for all phases of the acquisition of net-centric solutions, actionable guidance that meets DoD Network-Centric Warfare goals. The guidance in NESI is derived from the higher level, more abstract concepts provided in various directives, policies and mandates such as the *Net-Centric Operations and Warfare Reference Model* (*NCOW RM*) and the ASD(NII) *Net-Centric Checklist*, references (m) and (n), respectively. As currently structured, NESI guidance is captured in documents covering architecture, design and implementation; a compliance checklist; and a collaboration environment that includes a repository of guidance statements and code examples.

More specifically, NESI is a body of architectural and engineering knowledge that guides the design, implementation, maintenance, evolution, and use of the Information Technology (IT) portion of net-centric solutions for military application. NESI provides specific technical recommendations that a DoD organization can use as references. Stated another way, NESI serves as a reference set of compliant instantiations of these directives.

NESI is derived from a studied examination of enterprise-level needs and, more importantly, from the collective practical experience of recent and on-going program-level implementations. It is based on today's technologies and probable near-term technology developments. It describes the practical experience of system developers within the context of a minimal top-down technical framework. Most, if not all, of the guidance in NESI is in line with commercial best practices in the area of enterprise computing.

NESI applies to all phases of the acquisition process as defined in references (a) and (b) and applies to both new and legacy programs. NESI provides explicit counsel for building in net-centricity from the ground up and for migrating legacy systems to greater degrees of net-centricity.

NESI subsumes a number of references and directives; in particular, the Air Force *C2 Enterprise Technical Reference Architecture (C2ERA)*[2] and the Navy *Reusable Applications Integration and Development Standards (RAPIDS)*.[3] Initial authority for NESI is per the Memorandum of Agreement between Commander, Space and Naval Warfare Systems Command (SPAWAR), Navy PEO C4I & Space and the United States Air Force Electronic Systems Center, dated 22 December 2003, Subject: Cooperation Agreement for Net-Centric Solutions for Interoperability (NESI). The Defense Information Systems Agency (DISA) formally joined the NESI effort in 2006.

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[2] Air Force C2 Enterprise Technical Reference Architecture, v3.0-14, 1 December 2003.

[3] RAPIDS Reusable Application Integration and Development Standards, Navy PEO C4I & Space, December 2003 (DRAFT V1.5).

1.3 Releasability Statement

This document has been cleared for public release by competent authority in accordance with DoD Directive 5230.9 and is granted *Distribution Statement A: Approved for public release; distribution is unlimited*. Obtain electronic copies of this document at the following site: http://nesipublic.spawar.navy.mil.

1.4 Vendor Neutrality

NESI documentation sometimes refers to specific vendors and their products in the context of examples and lists; however, NESI is vendor-neutral. Mentioning a vendor or product is not intended as an endorsement, nor is a lack of mention intended as a lack of endorsement.

Code examples typically use open-source products since NESI is built on the open-source philosophy. NESI accepts inputs from multiple sources so the examples tend to reflect whatever tools the contributor was using or knew best. However, the products described are not necessarily the best choice for every circumstance. Users are encouraged to analyze specific project requirements and choose tools accordingly. There is no need to obtain, or ask contractors to obtain, the open-source tools that appear as examples in this guide. Similarly, any lists of products or vendors are intended only as references or starting points, and not as a list of recommended or mandated options.

1.5 Disclaimer

Every effort has been made to make this documentation as complete and accurate as possible. Even with frequent updates, this documentation may not always immediately reflect the latest technology or guidance.

1.6 Contributions and Comments

NESI is an open-source project that will involve the entire development community. Anyone is welcome to contribute comments, corrections, or relevant knowledge to the guides via the Change Request tab on the NESI Public site, http://nesipublic.spawar.navy.mil, or via the following email address: nesi@spawar.navy.mil.

1.7 Collaboration Site

The Navy has established a collaboration site to support NESI community interaction. It is located at https://nesi.spawar.navy.mil (user registration required). Use this site for collaborative software development across distributed teams.

2 Introduction

This document outlines process and system/product requirements appropriate to achieving NESI compliance in acquisition strategy planning, solicitation, and contract execution. It does not provide a general tutorial on the acquisition process or artifacts; only NESI-related concepts are discussed here.

For the overall structure and processes for capability acquisition, refer to Title 10 U.S.C., DoD 5000 series regulations, the Federal Acquisition Regulations (FAR), and the DoD Federal Acquisition Regulation Supplement (DFARS).

This document assumes that the acquisition program of interest is a new start or major modification, and that it complies with the systems acquisition lifecycle mandated by reference (b). *NESI Part 3: Migration Guidance* addresses the migration of legacy/existing systems to net-centricity .

This document provides guidance in the following sections:

- Section 3, *JCIDS - Capabilities-Based Acquisition*: Net-centric capability defined within JCIDS documents.
- Section 4, *Acquisition*: NESI guidance for DoD major milestone decision processes, and for planning and executing the acquisition.
- Section 5, *Solicitation Process*: NESI guidance for source-selection artifacts (RFP, SOO, SOW, CDRL).
- Section 6, *Contract Performance*: Post-award actions specific to NESI.

2.1 Audience

This document is written for those who are primarily engaged in, or planning, the acquisition or proposal of a system or product through the DoD acquisition process:

- Program managers
- Deputy program managers
- Contracting officers
- Chief engineers
- Contractor personnel

3 JCIDS - Capabilities-Based Acquisition

The NESI guidance audience should understand what the Joint Capabilities Integration and Development System (JCIDS) documents are and how they set the stage for the subsequent acquisition process and documentation. The user or the service sponsor community prepares the JCIDS documents; therefore, they not considered program-generated acquisition documents. However, subsequent program documents are greatly influenced by the information contained within the main JCIDS documents described below. JCIDS documents should incorporate NII Checklist and NESI guidance, as appropriate, as a means to increase interoperability and as an aide in developing architectural products.

Before initiating a program, use the JCIDS process to identify warfighting capability and supportability gaps and the Doctrine, Organization, Training, Materiel, Leadership and education, Personnel, and Facilities (DOTMLPF) capabilities required to fill those gaps. As described in reference (j), the integrated architectures and joint concepts provide an analysis construct to identify shortfalls and compare alternatives for improving joint warfighting capabilities and associated resource implications. The documentation developed during the JCIDS process provides the formal communication of capability needs between the warfighter, acquisition, and resource management communities.

The three main JCIDS documents are the Initial Capabilities Document (ICD), the Capability Development Document (CDD), and the Capability Production Document (CPD). The table below describes these documents, the milestones they support, and the NESI guidance most appropriate to each document for achieve the DoD net-centric attributes per reference (n).

Table 1 – Correspondence between JCIDS Documents, Process Milestones, and NESI Guidance

JCIDS Document	Milestones	Description	Relevant Guidance
Initial Capabilities Document (ICD)	A, B, C (if program initiation)	Defines capability gap in terms of functional area(s), relevant range of military ops, time, obstacles to overcome, and key attributes, with appropriate measures of effectiveness. Recommends materiel approach(s) based on cost analysis, efficacy, sustainability, environmental quality impacts, and associated risks.	NESI Parts 1 and 2
Capability Development Document (CDD)	B	Provides operational performance attributes, including supportability, for the acquisition community to design the proposed system. Includes key performance parameters (KPP) and other parameters that guide the development, demonstration, and testing of the current increment. Outlines the overall strategy for developing full capability.	NESI Parts 2, 3 Net-Ready KPP (NR-KPP) is developed for this document.

JCIDS Document	Milestones	Description	Relevant Guidance
Capability Production Document (CPD)	C	Addresses the production attributes and quantities specific to a single increment of an acquisition program. Supersedes threshold and objective performance values of the CDD.	NESI Parts 3, 5 Updated NR-KPP required in this document.

As noted in the table above, the Net-Ready Key Performance Parameters (NR-KPP) measure the net-centricity of a new program or major upgrade. The NR-KPP contains four elements:

- Verification of compliance with DoD information assurance (IA) requirements
- Compliance with the Net-Centric Operations and Warfare Reference Model (NCOW RM); see reference (m)
- Compliance with applicable GIG Key Interface Profiles (KIPs); see reference (r)
- Support for integrated architecture products that assess information exchange and use for a given capability

Note: For a detailed definition of the NR-KPP, see references (k) and (l).

A program's NR-KPP should assess information needs, timelines, Information Assurance (IA), joint interoperability, and supportability. It should assess the net-ready attributes for both the technical exchange of information and end-to-end operations. NESI guidance will help Program Managers meet their NR-KPP and other interoperability criteria.

4 Acquisition

In accordance with reference (a), programs proceed through an acquisition lifecycle of reviews and approvals. This ensures that the appropriate direction, support, and risk management strategies are in place for development and fielding. Part of this process involves applying the NESI framework throughout a system's lifecycle. Figure 1 below illustrates the acquisition lifecycle milestones and phases defined by reference (b).

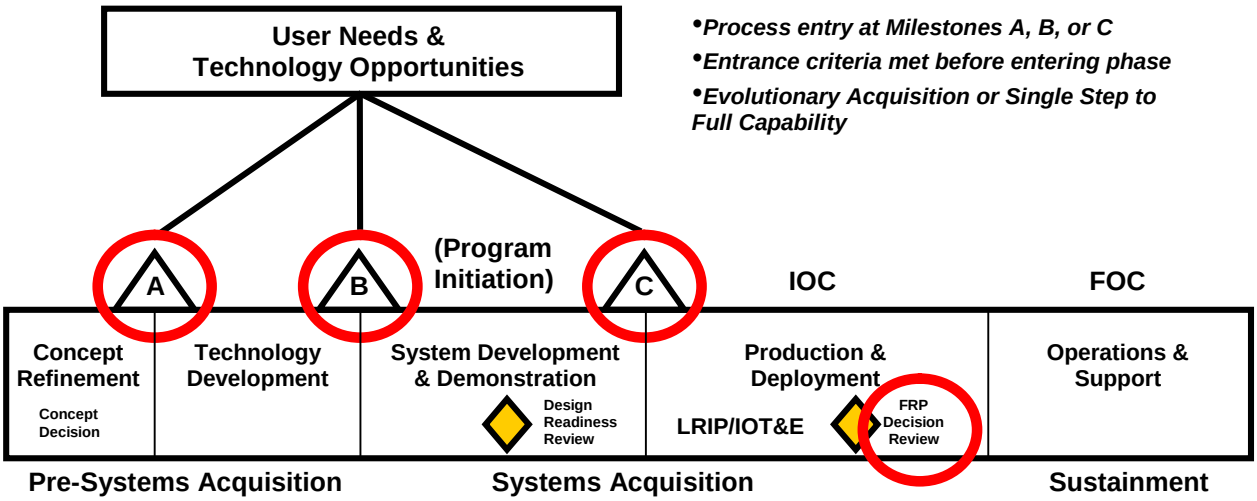

Figure 1 - The Defense Acquisition Management Framework, DoDI 5000.2

A program may be initiated at any milestone or phase as long as it has achieved the appropriate entrance criteria. In addition, reference (a) specifies that evolutionary acquisition is the preferred process for achieving a capability. Because most programs to which NESI applies focus on software development, they are particularly suited to evolutionary acquisition. For that reason, capability should be achieved incrementally; major upgrades will require the program to proceed through the acquisition process multiple times.

NESI provides guidance for all phases of an acquisition. Within each phase, the various DoD directives and instructions require certain documents, reports, and decisions. These items are reviewed by the Milestone Decision Authority (MDA) at program and milestone reviews. Program managers should work with the MDA to tailor the information and documentation expectations. NESI guidance provides assistance on how to incorporate net-centric requirements within the required acquisition documents and processes.

The matrix in Table 2, below, aligned with Enclosure 3 of reference (b), shows which major program documents require consideration of net-centric tenets and, additionally, which NESI parts address those requirements.

Table 2: Relationship of Acquisition Lifecycle to NESI Guidance Documents

Information Required	When Required *	Description	NESI Reference
Analysis of Alternatives (AoA)	Milestones A, B, C	• Aids in the resolution of MDA-level issues • Provides analysis and suggestions for performance characteristics	Parts 1, 2
Technology Development Strategy (TDS)	Milestones A, B, C	• Rationale and description of how the program will be divided into technology spirals and development increments, specific performance goals, and exit criteria for moving beyond prototype limitations • Program strategy for the total R&D program • Specific cost, schedule, performance goals, and test plan for first technology spiral development	Parts 1, 2, 3
Acquisition Program Baseline (APB)	Milestones B, C Full Rate Production (FRP) Decision Review	• Agreement between the PM and MDA that documents threshold and objective parameters for cost, schedule, and performance	Parts 1, 2
Acquisition Strategy	Milestones B, C FRP Decision Review	• High-level business and technical management approach designed to achieve program objectives within specified resource constraints • Framework for planning, organizing, staffing, controlling, and leading a program	Parts 1, 2, 6
Test and Evaluation Master Plan (TEMP)	Milestones B, C FRP Decision Review	• Describes all planned testing, including measures to evaluate the performance of the system during test periods, an integrated test schedule, and resource requirements	Parts 1, 2, 3

Information Required	When Required *	Description	NESI Reference
Information Support Plan (ISP)	Milestones B, C	• Describes system dependencies and interface requirements • Includes system interface descriptions, infrastructure and support requirements, standards profiles, performance measures, and interoperability issues	Part 1, 2

* Requirements vary between Acquisition Categories. See enclosure 3 of reference (b).

Program sponsors should consider the applicable NESI Parts and guidance when preparing JCIDS documents. Program managers should consider the applicable NESI Parts and guidance throughout the acquisition process, as the Milestone Decision Authority (MDA) will evaluate how the program's acquisition strategy proposes to achieve net-centric goals. The MDA will assess each program's progress at each program review and milestone decision. Reference (n) contains items that must be addressed in each milestone review across the acquisition lifecycle. *NESI Part 2: ASD(NII) Checklist Guidance* provides technical guidance for completing reference (n).

The level of detail to which a program can address these items depends on where the program is in the acquisition lifecycle. Address the following key NESI questions early in the program, include them in JCIDS documents, and solidify them for each milestone review:

- What capability is being acquired?
- What applications and services will need to be supported?
- What software component execution framework should it be based on?
- What services will this capability provide?
- What services will this capability require?
- What data objects will this capability provide?
- What data objects will this capability require?
- What communities of interest (COIs) will this capability support?
- What COIs will this capability interface with?

4.1 Pre-Systems Acquisition

Concept Refinement and Technology Development constitute Pre-Systems Acquisition efforts.

During Concept Refinement, the program manager ensures that an Analysis of Alternatives (AoA) is conducted to determine the best acquisition and technical approach for meeting user needs. Use *NESI Part 2: ASD(NII) Checklist Guidance* to scope promising alternatives to help with the market research and technology evaluation steps.

At the completion of the Concept Refinement phase, the MDA decides whether the program will continue into the next phase of the acquisition cycle. The MDA makes this decision based on the results of the Concept Refinement activity and the presentation of the preliminary acquisition strategy and other requirements at Milestone A.

During the Technology Development phase, technologies need to be identified. The program manager should assess the maturity of candidate technologies and the standards (if appropriate) that exist for a technology. Managers should focus on technologies with mature, stable standards and technologies that are supported by mature commercial product offerings. They should evaluate the use of enterprise license discounts for selecting products. Section 5.4 below details constraints on the infrastructure in the context of the Technical Requirements Document (TRD).

The Technology Development phase is used to assess the maturity of the technology required to support the acquisition and technical concept. As part of this assessment, an Acquisition Strategy (AS) and Information Support Plan (ISP) are submitted for Milestone B, the program initiation milestone decision.

The AS should address the program's plan for implementing the following:

- Component-based N-tier framework for reuse of software components that can be easily composed into new mission capabilities with minimal development effort.
- Commercial and DoD standards (e.g., DISR).
- Well-defined public service interfaces.

The AS and ISP must reflect the expected risks in meeting NESI design tenets for the proposed system. These risks should be documented in the program's risk assessment and mitigation plan.

Examples of risks to consider follow:

- Is the service you depend on at a compatible stage in the system acquisition lifecycle?
- Are the providers of other services and data objects that you depend on at compatible stages in the system acquisition lifecycle?
- Will the NCES/GIG enterprise services be available at the required time for integration with the system or product?
- What is the incremental cost of developing local enterprise services if NCES/GIG enterprise services are not available?
- Will a test infrastructure be available to validate performance for NCES/GIG enterprise service integration?

Program managers should consult Appendix D of *A Modular Open Systems Approach (MOSA) To Acquisition*, Version 2.0, September 2004; Appendix D contains a template for addressing MOSA in the program's acquisition strategy. The template provides standard text describing how to incorporate open-systems tenets, which programs may tailor to suit their needs.

4.2 Systems Acquisition

In Systems Acquisition, which comprises System Development and Demonstration, and Production and Deployment, the technological solution is chosen, the design solidified, and the system developed, tested, and deployed.

System Development and Demonstration are guided by an approved CDD and AS. Deployment is guided by the CPD and the AS. If the AS allows for an evolutionary strategy, the increments must be structured so that there is a clear statement of goals to ensure net-centricity for each increment and the final product.

4.2.1 Development

Use *NESI Part 2: ASD(NII) Checklist Guidance, NESI Part 3:Migration Guidance and NESI Part 5: Developer Guidance* for design guidance during system development. These parts of the implementation framework provide checklists and guidance to be used during engineering design reviews (e.g., PDR, CDR, etc.) prior to the Design Readiness Review (DRR). This ensures that the contractor conforms to NESI tenets. When evaluating and reviewing implementation of capabilities, use NESI *Part 5: Developer Guidance* as a source for lessons learned and best practices.

During program engineering design reviews, the government should do the following:

- Review the data design to ensure that metadata exists for all data items.
- Ensure that the data design adheres to the DoD data strategy; see reference (i).
- Review service designs to ensure that services are described using the Service Definition Framework defined in *NESI Part 2: ASD(NII) Checklist Guidance.*
- Review the security design against the principles in *NESI Part 2: ASD(NII) Checklist Guidance*.

4.2.2 Testing

CDD and CPD performance requirements flow into the Test and Evaluation Master Plan (TEMP), which states the structure and objectives of the test and evaluation program. The TEMP has significant dependencies on the JCIDS documents; it should contain the same NR-KPP that was defined in the CDD and CPD. The testing and evaluation of the program's ability to meet the threshold and objectives of the NR-KPP will occur at this stage.

To evaluate its NESI compliance, the program can demonstrate the following:

- Each element of a service interface is stable for both functionality and performance, and is included in a test suite.
- A security test plan, with thorough testing of service security that addresses threats such as impersonation, denial of service, message tampering, and eavesdropping.
- Each component and service is manageable, including the means to monitor the availability and status of each component or service locally and over the network.

4.2.3 Production and Deployment

A system must pass Milestone C to enter the Production and Deployment phase, and to gain approval for deployment,. The MDA may use the following NESI-related factors as part of the decision criteria:

- Acceptable performance in development, testing/evaluation, and operations
- Mature software capability
- Acceptable interoperability
- Acceptable operational supportability

Low Rate Initial Production (LRIP) limitations do not normally apply to software-intensive systems, but a limited deployment phase may be appropriate. The software's maturity level must be proven before baselining the system/increment fully and implementing a deployment or fielding plan. At the Milestone C decision, the MDA reviews all relevant program documents to ensure that the new system fulfills net-centric requirements. This must occur before the system can be approved for LRIP fielding. Then, after LRIP units pass Operational Testing the MDA can, via the Full Rate Production Decision Review, approve widespread fielding.

4.3 Sustainment

Sustainment, for the technologies to which NESI applies, involves version fixes, obsolescence replacement, and technologies insertion.[4] Any new capabilities trigger new increments which re-enter the acquisition process.

The core NESI precepts—component-based software, layered software architecture, service-oriented architecture, and the separation of implementation from the interface—reduce the disruption of these inevitable upgrades. Processes and funding are required to ensure that capabilities are maintained with suitable products and infrastructure. These actions, and the criteria for their initiation, are documented in the ISP for the program or product.

[4] See *NESI Part 3: Migration Guidance.*

5 Solicitation Process

This section describes how to incorporate NESI guidance and requirements during the solicitation process. The main goal is to develop a solicitation package, or Request For Proposal (RFP), that reflects consistent NESI guidance. The program manager shall execute the solicitation process according to the approved program acquisition strategy.

Approval of an acquisition program at Milestone B establishes the initial baseline, and it allows the release of a formal solicitation to industry for system or product development. However, a solicitation may be released in advance of Milestone B to support concept refinement and risk-reduction activities. The guidance below relates NESI to the components that are required in a solicitation package.

5.1 Incentivizing NESI

The maturity of the technology that is used to implement NESI requirements plays an important role in the contracting strategy. It determines the eventual allocation of risk between the contractor and the government. For example, if the program cannot use mature commercial off-the-shelf (COTS) components to construct the infrastructure, it may be exposed to unstable costs and scheduling. The contracting approach should reflect those risks. If the infrastructure elements are readily available but the net-centric requirements for applications or components have a high developmental uncertainty, this will also affect the contracting approach.

Determining net-centric compliance during systems engineering reviews is critical for a program to move forward. If the program offers award fees as incentives for contractor performance, the awards should be tied to successful delivery of net-centric products.

5.2 Statement of Objectives (SOO)

The Statement of Objectives (SOO) expresses the basic, top-level objectives of the acquisition. You may state these objectives in the Request for Proposal (RFP) in lieu of a government-written Statement of Work (SOW). This approach gives Offerors the flexibility to develop cost-effective solutions and the opportunity to propose innovative alternatives for implementing those solutions.

The SOO reduces the inherent instructions regarding how to accomplish the procured work usually found in the SOW. The SOO typically references a Technical Requirements Document (TRD) or similar instrument to convey the detailed technical performance requirements for the system or product. As part of the proposal, the Offeror must submit a Contractor Statement of Work (CSOW) for government evaluation. The CSOW details the tasks, processes, and products that accomplish the work proposed by the Offeror.

A key objective for the product delivered by the program is to implement the net-centric strategy and implementation details provided in NESI. The SOO should include objectives that support this goal, such as the following examples:

- Achieve N-tier architecture with separate client, presentation, middle, and data layers.

- Achieve a Service-Oriented Architecture (SOA) in which application functionality exists as a set of services that can be accessed by multiple clients and other services, layered on separate node-based and enterprise-wide infrastructures.
- Support defined communities of interest (COI).
- Develop or use defined infrastructure capabilities and put them in context. Specify whether the capabilities are internal to a system or sub-system (i.e., service), within the COI, or available to the enterprise.
- Acknowledge the program's dependencies on or contributions to the Net-Centric Enterprise Services (NCES) program, and identify dependencies on capabilities supplied by other programs.
- Define the program strategy for compliance with references (m) and (n).

Consult Appendix B of *A Modular Open Systems Approach (MOSA) To Acquisition*, Version 2.0, September 2004. It contains sample language that is suitable for an SOO and ensures Offerors apply MOSA standards.

5.3 Statement of Work (SOW)

The Statement of Work (SOW) defines program work tasks, performance requirements for conducting the work, and data requirements for reporting. The SOW should state that the system or product is being developed in accordance with the NESI Implementation Framework.

The SOW should not require or reference practices that are not specified in the NESI guidance or do not follow the NESI objective in providing net-centric interoperability. Specific choices regarding solutions, methodologies, processes, designs, and implementations are left to government technical coordinators or contractors as long as their choices remain within NESI objectives The SOW cannot simply state the task must be NESI compliant. The SOW must clearly state deliverables due to the Government (e.g., source code, make files, executables, installation scripts, documentation, test articles). A Contract Data Requirements List (CDRL) must be submitted with the SOW specifying expected deliverables; see Section 5.9 below for additional information.

Tasks should specify that the end product complies with reference (i) in accordance with reference (n) and includes the following key attributes:

- Make data visible, available, and usable to accelerate decision-making.
- Use metadata tags when publishing data sources to enable discovery by users.
- Post all data to shared spaces to provide access to all users except when limited by security, policy, or regulation.
- Reduce or eliminate point-to-point interfaces as a means of interoperability, and use many-to-many exchanges typical of a network-centric data environment.
- Provide N-tiered architecture with appropriate separation (e.g., client, presentation, middle, and data layers).

- Provide an SOA in which application functionality exists as a set of services that can be accessed by multiple clients and other services, layered on separate node-based and enterprise-wide infrastructures.

The SOW should call out the NESI design tenets of *NESI Part 2: ASD(NII) Checklist Guidance* as part of specifying the development of system product capabilities. Additionally, the SOW should require an explicit NESI Assessment and Migration task to be carried out through all phases of the contract.

5.4 Technical Requirements Document (TRD)

In conjunction with the CDD, a Technical Requirements Document (TRD) is sometimes prepared to articulate the more detailed system or product-level requirements necessary for meeting user needs or integrating the program with the enterprise.

For NESI-specific information, the TRD should emphasize a minimalist[5] approach to architecture.

The TRD should address these key principles:

- **Component-based software**: Mission applications are architected as components integrated within a component framework.
- **Layered software architecture**: Application software is separated into N tiers that separate concerns; minimally, client, presentation, middle, and data tiers.
- **Service-oriented architecture (SOA)**: Services enable access to data and application functionality through public interfaces exposed to the enterprise.
- **Separation of implementation and interface**: Services expose mission capabilities through well-defined interfaces and provide reliable and scalable components.

5.5 Data Rights (Contract Section K, Parts I and IV)

To achieve NESI's goals, which are based on a shared service and components approach, it is imperative that government rights and contractor intellectual property rights are carefully defined.

Follow these steps during the solicitation process to ensure that the property rights are clearly defined:

1. Clearly state and identify government-supplied components.
2. Ensure that the contractor/subcontractor signs Use and Non-Disclosure Agreement (DFARS 252.227.7103 and/or 252.227-7025).
3. Provide contractor/subcontractor with Labeling & Statement of Government Purpose Rights associated with government-supplied component software.

[5] A minimalist approach includes everything that is necessary and only that which is necessary.

4. Define terms of contract. For example, indicate whether the government is fully or partially funding the work or if it is being funded through the private sector.
5. Ensure that the contractor/subcontractor files Identification & Assertion of Restrictions with government contract officer.
6. Review by government counsel.
7. Negotiate rights and restrictions, if applicable.
8. Negotiate time, cost, and licenses.
9. Prepare contract CDRLs.
10. Award contract.

The government's needs are served in many cases by "Government Purpose Rights," but determining the correct rights depends on an analysis of the funding source of the development of government intellectual property and program requirements. For example, if the intellectual property were developed completely at government expense, the government would be entitled to unlimited rights, not Government Purpose Rights.

The chosen data rights should include all of the elements needed to develop and deploy the system, including the following:

- Executable code and binaries, including the specified programming languages, libraries, and tools
- Software version description, including the specified programming languages and tools
- Package description: makefiles or COE segment description
- Environment description
- Source code including the specified programming languages and tools
- Ownership/licensing and permission information
- Installation script files in uncompressed segment installer format
- Software test programs and source code, including tools

DFARS Clauses

The Contracting Officer should ensure that the following provisions are included in the solicitation.

252.227-7017	Identification and Assertion of Use, Release, or Disclosure Restrictions (Jun 1995).
252.227-7028	Technical Data or Computer Software Previously Delivered to the Government (Jun 1995).

5.6 Instructions to Offerors/Instructions for Proposal Preparation (ITO/IFPP/RFP Section L)

Section L of the RFP instructs the Offeror to provide information necessary to support government review and evaluation of the proposal based on the criteria established in Section M of the RFP. In Section L, contractors should address NESI design tenets in the technical proposals. If the proposal requires deviations from NESI guidance, the Offeror must thoroughly explain the issues and exceptions, and illustrate how the proposal will satisfy performance requirements of the end product without increasing program risk or reducing system net-centricity.

The Offeror will describe how the proposed system and technical architecture implements the NESI Implementation Framework. The Offeror will describe how the proposed technical architecture does the following:

- Builds on the technical criteria in NESI
  - Discuss how the proposed approach integrates NESI concepts
  - Discuss those aspects that do not integrate NESI and provide rationale for exclusion
  - Discuss compatibility of delivered products with legacy and NESI-compliant software
- Separates application functionality from infrastructure
- Distinguishes local and enterprise infrastructure usage
- Develops mission applications as components of a component framework
- Exposes mission functionality between services
- Uses services from other systems
- Conforms to the DoD data strategy, reference (i), and uses enterprise metadata for semantic interoperability
- Uses NCES or other DoD approved enterprise services. Where the enterprise service is not available, show how the proposed architecture either uses a locally-provided version of the service or provides the service as a locally instantiated version of the enterprise service (using the NCES Service interface); base locally provided services on NESI tenets and develop a migration plan to interface with or replace local services with enterprise services when applicable.

Consult Appendix B of *A Modular Open Systems Approach (MOSA) To Acquisition*, Version 2.0, September 2004. It contains sample language that is appropriate for use in the "Instructions for Proposal Preparation," which evaluators may use to assess Offerors' MOSA compliance.

5.7 Evaluation Criteria (RFP Section M)

The government will evaluate the Offeror's architecture and technical design solution for NESI implementation, with emphasis on the following:

- How the architecture builds on the technical criteria in NESI:
  - How the proposed approach integrates NESI concepts.
  - Compatibility of delivered products with required legacy and NESI-compliant software.
- How the architecture separates application functionality from infrastructure.
- How the architecture distinguishes between local and enterprise infrastructure usage
- How the approach develops mission applications as components of a component framework
- How the approach exposes mission functionality between services
- How the approach uses services from other systems
- How the approach conforms to the DoD data strategy, reference (i), and uses enterprise metadata for semantic interoperability
- How the approach uses NCES services

Each contract award will be based on criteria suited to a particular acquisition. If the solicitation and subsequent contract award requires implementing NESI, Offerers must comply with the stated requirements or risk being non-responsive or non-compliant to the solicitation and contract.

As described in Section 5.5, the data rights defined within the CDRL will also be considered during award evaluation, mindful of the restriction in Title 10 U.S.C. §2320 which prohibits making the surrender of intellectual property rights a basis of awarding a contract. Accordingly, the Government will evaluate the Offeror's response to the employment of NESI guidance, required in Section L, as well as the Offeror's response to the Section K provision DFARS 252.227-7017 "Identification and Assertion of Use, Release, or Disclosure Restrictions (Jun 1995)."

Consult Appendix B of *A Modular Open Systems Approach (MOSA) To Acquisition*, Version 2.0, September 2004. It contains sample indicators that are appropriate for evaluation criteria calling for application of MOSA.

5.8 Section I Clauses

The Contracting Officer should ensure that all of the following clauses are included in the contract, as appropriate.

FAR Clauses

52.227-1	Authorization and Consent (Jul 1995)
52.227-1	Authorization and Consent (Jul 1995) – Alternate 1 (Apr 1984)
52.227-2	Notice and Assistance Regarding Patent and Copyright Infringement (Aug 1996)
52.227-3	Patent Indemnity (Apr 1984)
52.227-10	Filing of Patent Applications – Classified Subject Matter (Apr 1984)

52.227-11	Patent Rights – Retention by the Contractor (Short Form) (Jul 1997)
52.227-12	Patent Rights – Retention by the Contractor (Long Form) (Jan 1997)

DFARS Clauses

252.227-7013	Rights in Technical Data – Noncommercial Items (Nov 1995)
252.227-7014	Rights in Noncommercial Computer Software and Noncommercial Computer Software Documents (Jun 1995)
252.227-7015	Technical Data – Commercial Items (Nov 1995)
252.227-7016	Rights in Bid or Proposal Information (Jun 1995)
252.227-7019	Validation of Asserted Restrictions – Computer Software (Jun 1995)
252.227-7025	Limitations on the Use or Disclosure of Government – Furnished Information Marked with Restrictive Legends (Jun 1995)
252.227-7027	Deferred Ordering of Technical Data or Computer Software (April 1988)
252.227-7030	Technical Data – Withholding of Payment (Mar 2000)
252.227-7034	Patents – Subcontracts (Apr 1984)
252.227-7036	Declaration of Technical Data Conformity (Jan 1997)
252.227-7037	Validation of Restrictive Markings on Technical Data (Sep 1999)
252.227-7039	Patents – Reporting of Subject Inventions (Apr 1990)

5.9 CDRL Guidance

The Contract Data Requirements List (CDRL) contains detailed descriptions of the contract deliverables. The CDRL also specifies the format of the deliverables (electronic, media format, etc.) and the number of copies to produce when a printed document is required.

To ensure NESI compliance, include detailed descriptions of the following CDRL items:

- Executable code and binaries (including the specified programming languages, libraries, and tools)
- Software version description, including the specified programming languages and tools
- Package description: makefiles or COE segment description
- Environment description
- Ownership/licensing and permission information
- Installation script files in uncompressed segment installer format
- Software test programs and source code, including tools
- Software test plans, test report, test data (if available), and test metrics
- Software requirements specification
- Software design description

- NESI Assessment and Migration Plan (see Section 5.10)

The frequency and delivery dates of the deliverables must be specified, along with a list of deliverable recipients. Deliverables must support open-source operations.

5.10 NESI Assessment and Migration Plan

This plan is an opportunity for the contractor to present the Program Office with a detailed, candid analysis of how NESI will influence the system or product development. This presentation lays the groundwork for the organization of spirals, detailed schedule development, and risk assessment. Contractors should highlight areas where NESI guidance could impact mission requirements such as performance. They may also propose tests and risk mitigation studies to inform decisions and any necessary tailoring of NESI.

The Migration section of the plan outlines the contractor's proposal for addressing NESI guidance items that were deferred from the present spiral or increment. This section also addresses the issue of migrating legacy parts of the system to become net-centric, in the spirit of *NESI Part 3: Migration Guidance*.

The structure of the Assessment and Migration Plan should parallel the structure of NESI Parts 1 through 5, at least at a high level, but the content will be unique to each program using it. The possible topics and phasing of the material are so diverse that each Program Office is encouraged to tailor its requirements based on this discussion.

Contractors should complete the assessment after starting high-level design, but it is up to the individual Program Office to schedule this CDRL based on the Statement of Work tasks and logical flow.

6 Contract Performance

As noted above, the CDRL should include a NESI assessment and migration plan. This plan should assess all SOW software development efforts for compliance with NESI standards. This plan should show how the Offeror's software development approach integrates NESI guidance. If the proposed approach does not comply with NESI guidance, the plan should show how it will achieve compliance during the program lifecycle. The plan should specifically address the risks (high, medium, low) associated with NESI implementation and mitigation strategies.

NESI assessment and compliance should be a required topic at all program management reviews. Regular technical interchange meetings for evaluating NESI implementation and compliance are also recommended. Contract actions such as award fees should be tied to milestones of successful NESI compliance evaluations.

In addition to the aforementioned guidance, the Navy PEO C4I & Space maintains a data repository that includes fully-commented component source code and executable components. Offerors are required to post developed software to this open-source site (https://nesi.spawar.navy.mil). Specific instructions appear in separate Navy PEO C4I & Space policy.